



**CALIFORNIA ISO**

California Independent  
System Operator

# **2002 LONG RANGE LOAD FORECASTS**

**OCTOBER 12, 2001**

**By**

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***PRELIMINARY***



# Load Forecasting Methodology

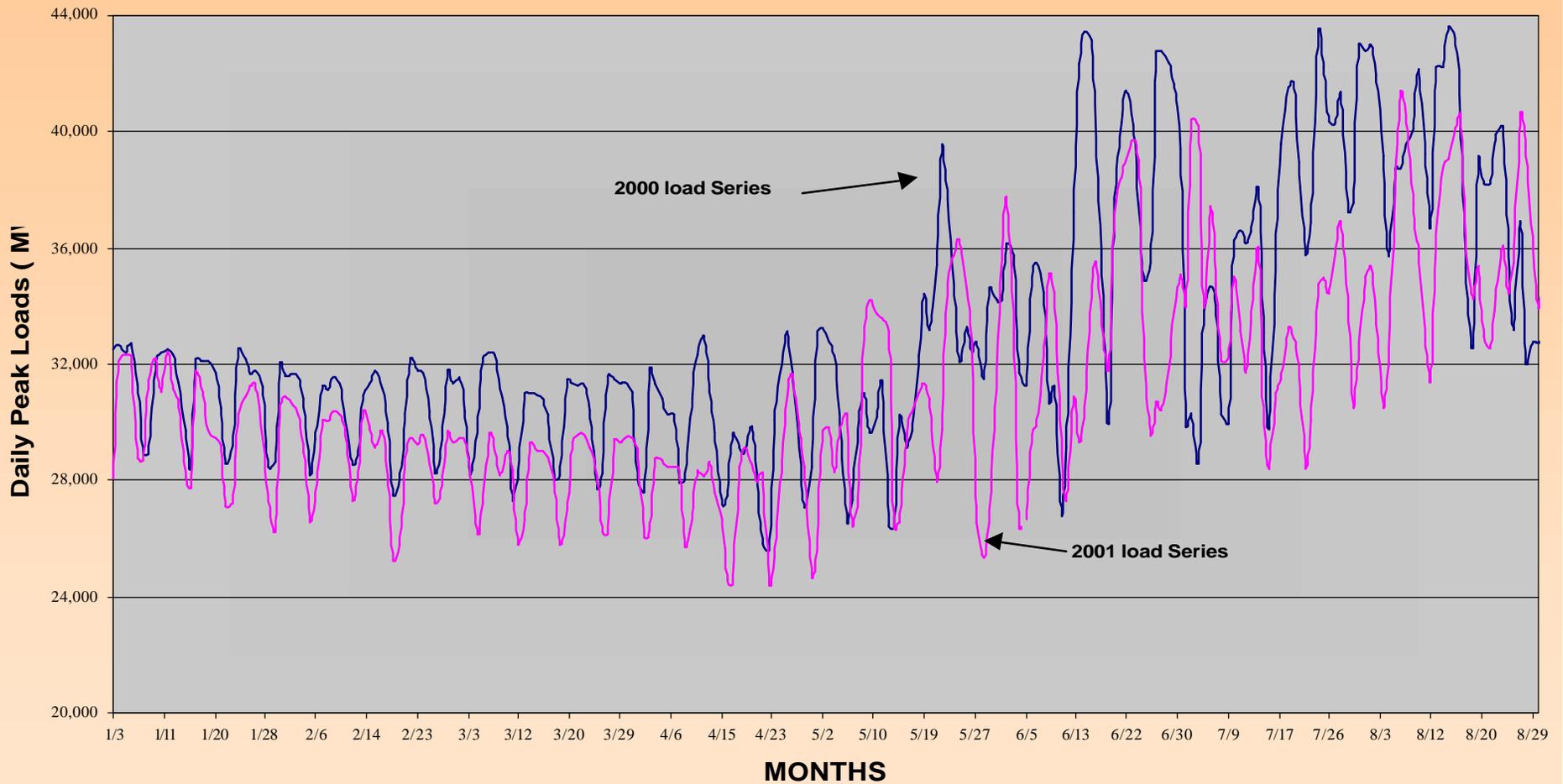
- **Multivariate non-linear Neural Network models were developed.**
- **Available information about weather, demographics, economics, and climatic conditions were used as model inputs.**
- **Predicted loads for 1998-2001 were within the expected range of specifications. Outcomes of statistical tests were significant.**
- **Range forecasts are desirable for long term planning and decision-making processes. Future loads are expected to fluctuate over a range because of changes in energy intensity and utilization.**
- **Given the level of risks and uncertainties, an expected load will fall within the 95% Statistical Tolerance Confidence band.**
- **Multiple scenarios were analyzed using simulation models .**



## Actual Load Comparison by Matching Day Types

ChartRev. 3

Period: January-August, 2000 Vs. 2001



Source: pks:u:/assign....KG/monthly comparison using Cpyor daily max. load data,9/4/01



## Revised Peak Load Forecasts with New Economic and Conservation Assumptions<sup>1</sup>

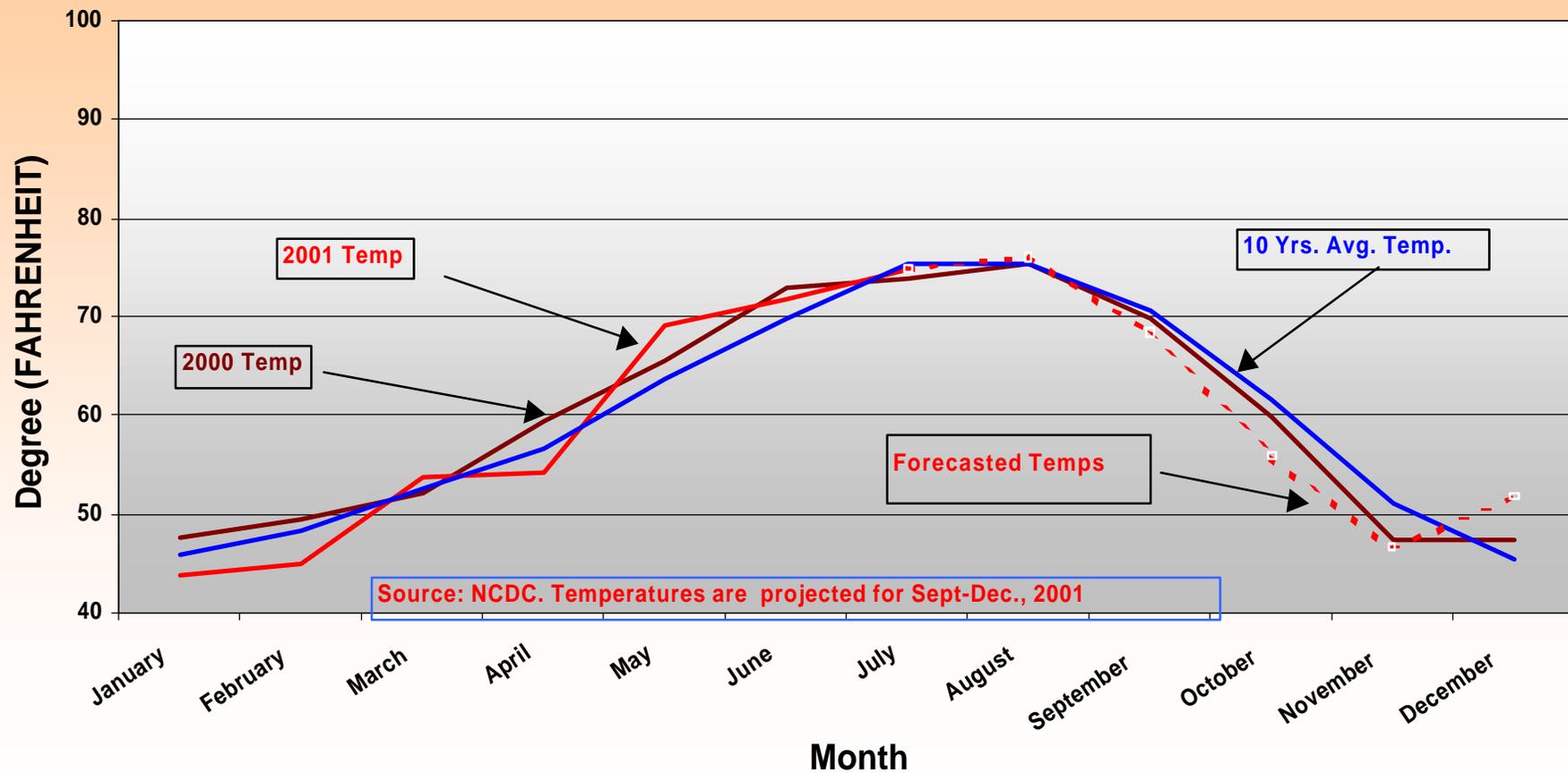
Year	Month	Forecast	Actual <sup>2</sup>	TALoad <sup>3</sup>	Diff	%Error	Assumptions
2001	January	32466	32623		157	0.48%	1. CGDP 1.0%
	February	30431	30683		252	0.82%	2. Inflation 2.3%
	March	29644	29778		134	0.45%	3. Unemployment. 5.0%
	April	31695	31770		75	0.23%	4. Manfg.& Services -20%
	May	37805	37808		3	0.01%	5. CDPI 1.5%
	June	39974	39762		-212	-0.53%	6. Rel. Energy Prices 3%
	July	41410	41192		-218	-0.53%	7. Ngas Price 3%
	August	42135	41419		-716	-1.73%	8. Population 1.7%
	September	37167	37993		826	2.17%	9. Constructions - 3.5%
	October	34359	38806	38792	14	0.04%	10. Housing - 1%-3%
	November	32524					11. Wtd. Max. Temp: 15 Station
	December	33586					12. Avg. weather variables.

**Average forecasting error** **0.14%**  $R^2=0.99$ ,  $MAPE=0.01$

**Note:** 1. Forecasting outcomes are based on the modeling assumptions. Actual observations may vary from forecasted outcomes because of the changes in circumstances or assumptions.  
 2. Actual Load includes interrupted loads at the Peak hour. July 3rd: 40366+826=41192  
 3. TALoad is the temperature adjusted load due to an extreme temperature difference from normal.



## Monthly Average Temperatures In California

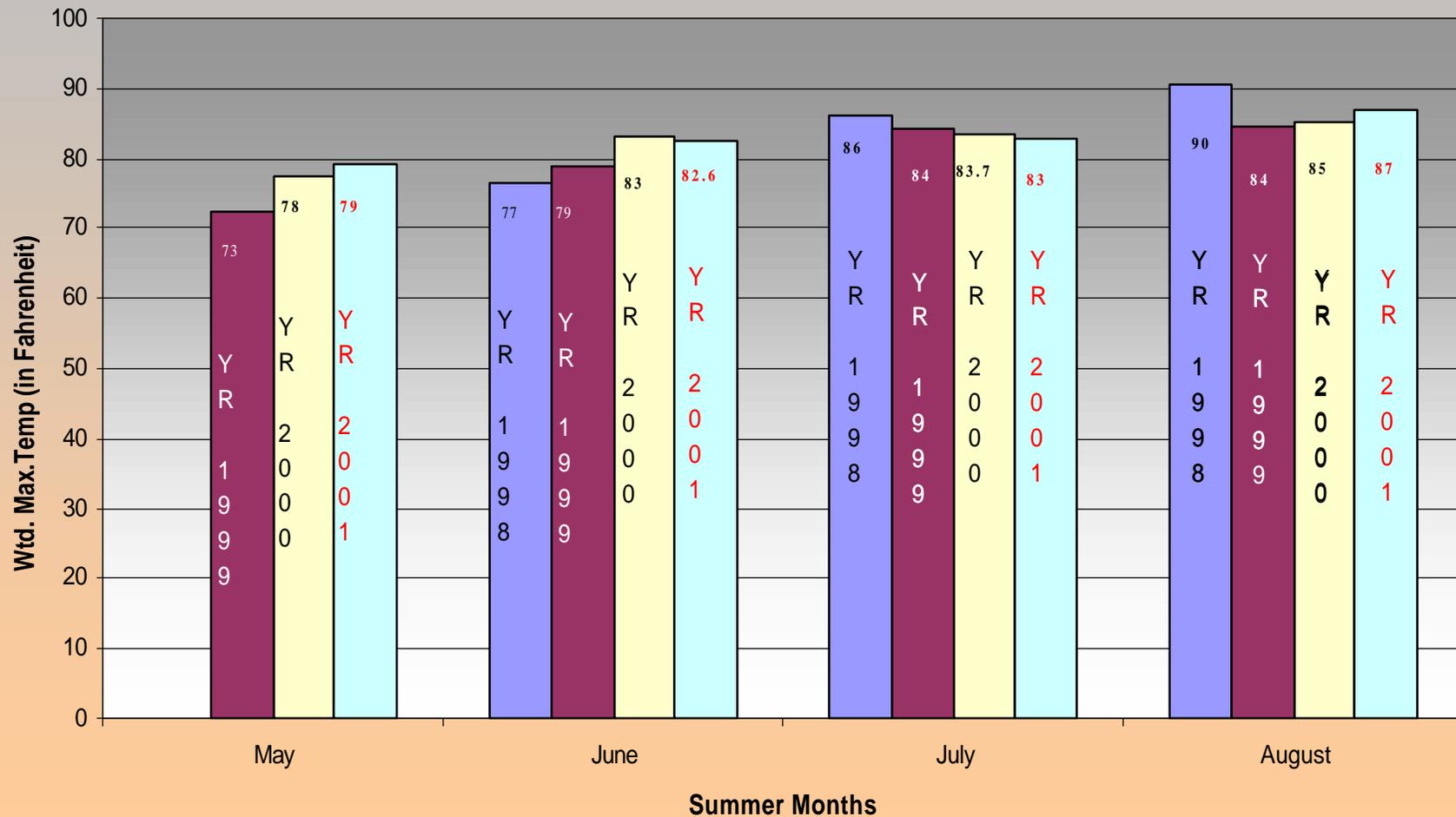




## A Weighted Monthly Maximum Temperature In CAISO Area

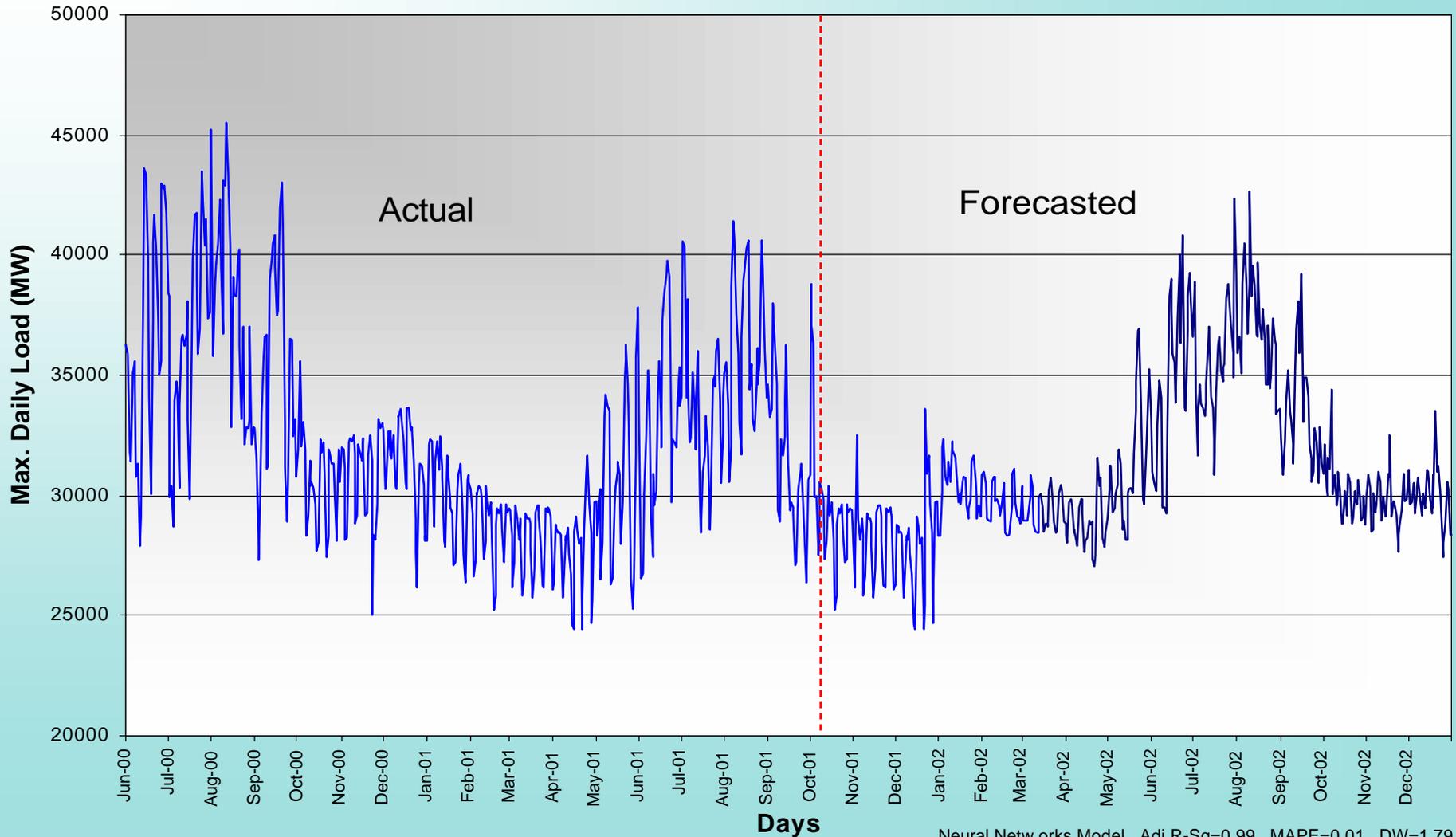
Chart 1

(Based on 15 Weather Stations Monitored by ISO)





## Actual and Forecasted Peak Load Period: June 2000 to December 2002

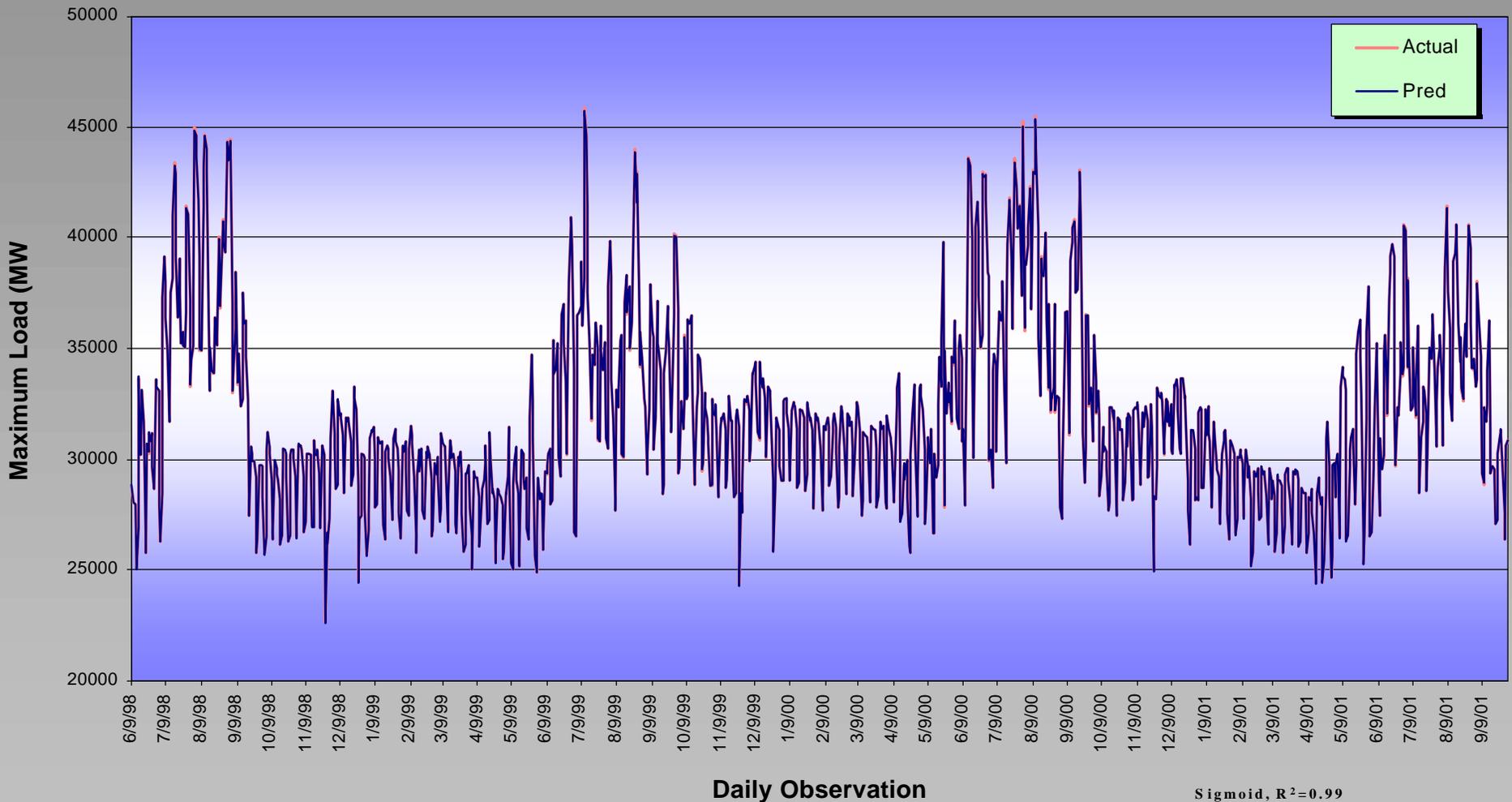


U:PSircar/CAISO FORECAST/Septforecast01/sept01m1a

Neural Netw orks Model, Adj.R-Sq=0.99, MAPE=0.01, DW=1.79



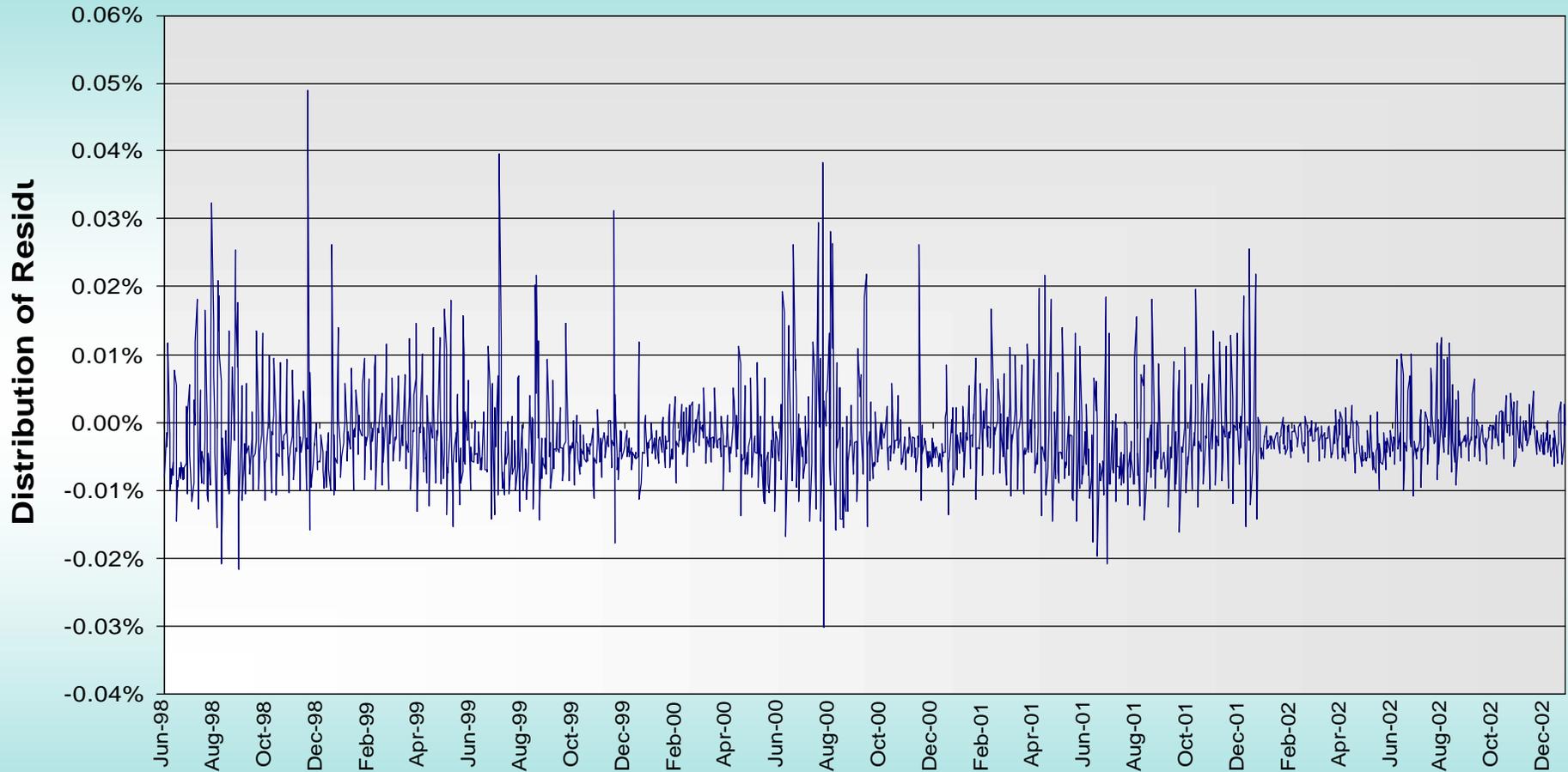
**Actual Vs. Predicted Peak Load**  
Period: June 1998-Sept. 2001





## Percent Residual Distribution

Period: June 1998-December 2002

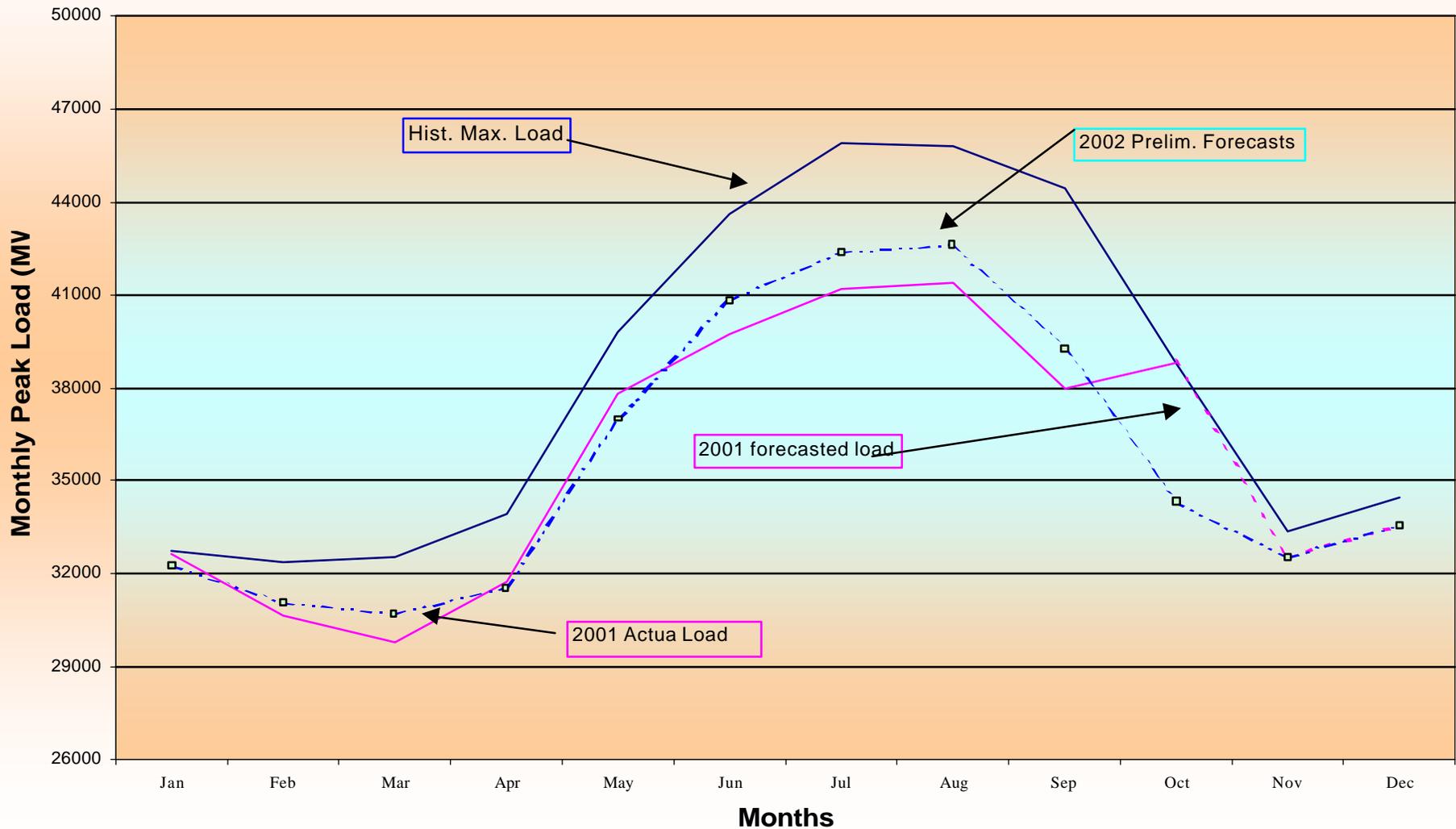


No. of Days

**Neural Networks Models,**  
**Adj-R<sup>2</sup>=0.99, MAPE=0.01,**  
**DW(p=1,q=0,sq=1,dp=0)=1.79**



## Comparison of Historical Maximum vs. 2001 Peak Load





## FORECASTED RESULTS

**PRELIMINARY**

- Actual and range forecasts for 2001 and 2002 monthly peak loads are presented.
- Actual load could vary markedly under extreme weather conditions.
- Base case forecasts are based on an average temperature and recessionary economic conditions.
- Actual loads for 2002 may lie between the bands.

Actual and Forecasted Monthly Peak Loads					
PEAK LOAD EXPOSURE MW					
<u>Month</u>	<u>Actual</u>	<u>Predicted</u>	<u>Forecasted</u>		
	<u>2001</u>	<u>2001</u>	<u>Low</u>	<u>2002 Base</u>	<u>High</u>
Jan	32623	32466	31347	32250	33154
Feb	30683	30431	29604	31091	32577
March	29778	29644	28596	30737	32878
April	31770	31695	30275	31555	32836
May	37808	37805	35066	36970	38875
Jun	39762	39974	39279	40834	42388
July	41192	41410	39543	42361	44624
Aug	41419	42135	40696	42640	45179
Sept	37993	37167	36954	39247	41540
Oct	38806	34359	31605	34364	37123
Nov		32524	30194	32522	34849
Dec		33586	31300	33548	35796

Load forecasts are based on certain economic, demographic, weather and climatic conditions.